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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/583,880   | 01/03/2007  | Yoshihito Maeno      | CU-4890 RJS         | 8758             |
| 26530 7590 10/28/2011<br>LADAS & PARRY LLP<br>224 SOUTH MICHIGAN AVENUE<br>SUITE 1600<br>CHICAGO, IL 60604 |             |                      |                     |                  |
| EXAMINER   |             |                      |                     |                  |
| ANGEBRANDT, MARTIN J   |             |                      |                     |                  |
| ART UNIT   |             | PAPER NUMBER         |                     |                  |
| 1722   |             |                      |                     |                  |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/583,880

**Applicant(s)**

MAENO ET AL.

**Examiner**

MARTIN ANGEBRANDT

**Art Unit**

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 9/26/2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5) ☒ Claim(s) 57, 58, 60, 62, 63, 65-70, 72 and 74 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 57, 58, 60, 62, 63, 65-70, 72 and 74 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-893)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Paper No(s)/Mail Date \_\_\_\_
- 6) ☐ Notice of Informal Patent Application
- 7) ☐ Other: \_\_\_\_

1. The response of the applicant has been read and given careful consideration. Responses to the arguments of the applicant are presented after the first rejection to which they are directed. Rejection of the previous action not repeated below are withdrawn.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 63 and 65-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. JP 08-190334, in view of Keys et al. '102, Monroe '790, Stevenson '409, Haugh '526 and Baum et al. '275.

Ito et al. JP 08-190334 teaches the composition of example 1, which includes bisphenol A resin (binder), triethyleneglycol diacrylate, diphenyliodonium hexafluorophosphate, 2-nitrobenzyl tosylate, and 3,3'carbonyl bis(7-diethylamino)coumarin coated upon a substrate and provided with a PVA protective layer. This is exposed holographically using the 514.5 nm line of and argon ion laser [0038]. The use of other lasers is disclosed [0035]. Example 3 uses (cyclopentanone, 2,5-bis{[4-(diethylamino)-phenyl]methylene} as the sensitizing dye and results in a diffraction efficiency of 94% [0041-0042]. The use of other iodonium salts including bis(p-tert-butylphenyl) iodonium salts is disclosed [0026]. Useful sensitizing dyes are disclosed [0027].

Keys et al. '102 teaches in example 55, the use of a 514 (the emission line is actually 514.5 nm) from an argon ion laser in a composition if Vinac (PVAc binder), Photomer (acrylate

monomer), SR-349 (diacrylate monomer), TBPM (methacrylate monomer), HABI (photoinitiator), MMT, FC and JAW (sensitizing dye) which after processing including heating forms a hologram which replays at 508 nm with a diffraction efficiency of 98%. (9/15-51,19/3-48,34/57-35/20). Useful bis(p-dialkylaminobenzylidene)ketones are disclosed by Baum 3,652,275) and include DEAW, DMJDI, and DBC (9/15-25, 8/62-9/52). Compositions 14-20 are similar, but use DEAW (cyclopentanone, 2,5-bis{[4-(diethylamino)-phenyl]methylene} (1912-13) as the sensitizer. The use of the media with a 488, 514 (514.5) or 645 nm laser is disclosed (15/62-64). The formation of reflection holograms by passing the reference beam through the holographic recording materials and having an object reflect the light back to the medium (beam traveling in the opposite direction) so the beams interfere. (2/3-36).

Stevenson '409 teaches the duplication/copying of holograms using contact copying using a beam of coherent light (laser) to expose a photopolymeric holographic recording material in contact with a master hologram. In the case of copying a reflection hologram, the master and photopolymer are contacted and the light is incident from the side of the recording material (reference light) and the reflection from the master hologram corresponds to the object beam [0004].

Haugh '526 teaches the use of either two beams exposure (Example XXXVI) or contact copying methods (example I) for forming volume holograms. Contact copying is much quicker than forming multiple originals and can be used with in expensive incoherent light sources.

Monroe '790 establishes the absorption maxima and absorptivity of these sensitizing dyes (col 15).

| Compound | $\lambda_{max}$ | $\epsilon_{max}$ | $\epsilon_{488}$ | $\epsilon_{515}$ |
|----------|-----------------|------------------|------------------|------------------|
| DBC      | 481 nm          | 56,200           | 51,400           | 7,200            |
| DEAW     | 477 nm          | 76,000           | 65,200           | 3,100            |
| DMJDI    | 442 nm          | 37,400           | 6,900            | 0                |
| JAW      | 496 nm          | 59,600           | 57,600           | 21,300           |

The holographic recording compositions using DEAW are anticipated by the examples, but their use with a 514.5 nm laser is not. The examples using JAW and the 514.5 nm argon ion laser line anticipate the composition claims and method claims rejected under this heading.

Baum et al. '275 is referred to by Keys et al. '102 for the teachings of sensitizers. The general formula is presented in column 2 and R<sub>1</sub> or R<sub>2</sub> can be hydrogen or C1-4 alkyl. (2/15-34).

It would have been obvious to one skilled in the art to modify the teachings of example 3 of Ito et al. JP 08-190334 by using a different disclosed iodonium salt such as bis(p-tert-butylphenyl) iodonium hexafluorophosphate based upon the disclosure of equivalence at [0026] of Ito et al. by using a contact copying process such as that taught by Stevenson '409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526 and the teachings of Keys et al. '102 in column 3 and Monroe '790 establishes the absorption maxima and absorptivity of these sensitizing dyes, to use the 514.5 nm laser taught at 15/62-64 of Keys et al. '102 and to use 2,5-(bis(4-butylaminobenzylidene)cyclopentanone in place of DEAW based upon the disclosure of the general formula in Baum et al. '275 with a reasonable expectation of success based upon DEAW having significant absorption (molar absorptivity) between 488 and 532 nm as evidenced by Monroe '790 and the direction to Baum et al. for useful photoinitiators in Keys et al. '102.

The applicant argues that the compound D-3 has a different absorption form the claimed compound. It may be that the measurements were made in different solvents, but the applicants

position is untenable as **the compound DEAW is the same compound as compound 3 previously in the claims and the butylhomologue is known as a useful photoinitiator in the photopolymer art as evidenced by Baum et al. .** The rejection stands noting that the use of the DEAW, the ethyl analogue is compound 4, in the claims is evidenced to have sensitivity at 532 nm, which is more than 14 nm from the 477 nm absorption and one skilled in the art would not expect a significant shift in absorption when using butyl (C4) moieties, rather than ethyl (C2) moieties given these are closely related alkyl chains. While the use of the composition with lasers offset from the absorption/sensitization maximum may not be optimal, there is a reasonable expectation of the dye being useful with various laser wavelengths covering a significant portion of the spectrum (note the use of DEAW with 488 and 532 nm, which are separated by 44 nm.). The examiner also notes that the laser wavelengths disclosed instant specification and recited in the claims are not from tunable lasers and so these lasers are somewhat inflexible in their emissions as they can only be tuned to specific emission lines corresponding to lasing transitions.

The addition of Ito et al. JP 08-190334 addresses the modification of the claims as the epoxy resin functions as a binder. While the various references may point out deficiencies, none of these relate to the sensitizers or the described benefits of copying rather than two beams exposures and so any arguments citing these leave the rejection unscathed. Within the art, it is accepted that those developing new inventions and techniques stand on the shoulders of those who came before them, so it is reasonable that they would look to the prior art for other known sensitizers or techniques for recording holograms.

If the applicant would consider comparative data, the examiner would be open to an interview. The examiner had considered the possibility that the media had a high concentration of sensitizing dye, so the penetration of the light into the thickness of the recording medium using strongly absorbed wavelength (absorption maximum), but the amounts used in the examples are ~ 0.5 wt, which is similar to that Ito et al. (~0.75 wt%) and within the range of ~0.1 to 10% (based upon the binder weight) taught at [0031]

4. Claims 57,58,60,62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. JP 11-161140, in view of Kawabata et al. '340, Harada et al. JP 01-287105, Stevenson '409 and Haugh '526.

Ito et al. JP 11-161140 teaches in examples 1, an epoxy oligomer (binder), triethylene glycol diacrylate, diphenyliodonium hexafluorophosphate and a sensitizing dye, and is recorded upon using a 647.1 nm laser. [0046-0050]. The example using dye 4 is similar and exhibits a diffraction efficiency of 82% [0054-0056]. The use of other cyanine sensitizing dyes are disclosed, such as the dye 2-[[3-allyl-4-oxo-5-(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]-3-ethyl-4,5-diphenylthiazolium iodide is disclosed [0040]. The use of other iodonium salts including bis(p-tert-butylphenyl) iodonium salts is disclosed [0034].

Kawabata et al. '340 in example 24 uses dye 4 (15/12-13) with a cationically polymerizable compound, a free radically polymerizable monomer, a diphenyliodonium salt, and a binder (P-1) and uses 632.8 nm light to record a hologram (12/16+ and ). Other cyanine sensitizing dyes are disclosed, such as those taught by JP 01-287105 and dye 2-[[3-allyl-4-oxo-5-

(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]-3-ethyl-4,5-diphenylthiazolinium iodide.

Harada et al. JP 01-287105 teaches various counterions/anions for the dyes for formula A (page 1) including halides, tetrafluoroborate, hexafluorophosphate, perchlorate, methylsulfate and toluenesulfate (page 2/lower left column). Specific examples of dyes bounded by A are illustrated the lower right column of page 4 (note dye A-3). These are disclosed as useful in sensitizing onium salts. (abstract and formula III on page 3).

It would have been obvious to one skilled in the art to modify the medium using dye 4 of Ito et al. JP 11-161140, by using another disclosed iodonium salt such as bis(p-tert-butylphenyl) iodonium hexafluorophosphate based upon the disclosed equivalence at [0034] of Ito et al. and using another disclosed dye, such as 2-[[[3-allyl-4-oxo-5-(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]3-ethyl-4,5-diphenylthiazolinium disclosed at [0040] but with a different counterion with a reasonable expectation of success based upon the disclosure of equivalence in the Kawabata et al. '340 and Harada et al. JP 01-287105 references and to modify the recording process using contact copying process to form a copy of the hologram as taught by Stevenson '409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526 and the teachings of Kawabata to the formation of reflection holograms.

The applicant argues that the dye 4 of 1,3,5-thiadiazolidene ring which is different from that of the claim. This is admitted as the rejection is a 103 rejection and not a 102 rejection, but the applicant does not address the dye 2-[[[3-allyl-4-oxo-5-(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]3-ethyl-4,5-diphenylthiazolinium iodide



taught at 5/18-19, which is the same dye as in the claims (the naming differs only in the order of recitation). The dye is used with 632.8 nm laser which is more than 14 nm from the absorption (602 nm) disclosed in the specification in table 1. While the use of the composition with lasers offset from the absorption/sensitization maximum may not be optimal, there is a reasonable expectation of the dye being useful with various laser wavelengths covering a significant portion of the spectrum (note the use of DEAW with 488 and 532 nm, which are separated by 44 nm.). The examiner also notes that the laser wavelengths disclosed instant specification and recited in the claims are not from tunable lasers and so these lasers are somewhat inflexible in their emissions as they can only be tuned to specific emission lines corresponding to lasing transitions.

In response to the arguments of the applicant, the Ito et al. JP 11-161140 addresses the issue of the (reactive) binder, photosensitive monomer, photoinitiator and sensitizing dyes without other components and the use of 647.1 nm laser with these compositions.

5. Claims 69,70,72 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi et al. JP 06-175554, in view of Okubo et al. '324, Ernst et al. DE 100571141, Yamaguchi et al. JP 06-175554, Stevenson '409 and Haugh '526.

Okubo et al. '324 in example 21 teaches a composition of dye D-22 (see col 11-12), a photoinitiator, acrylates, an iron arene initiator. (19/65-20/25). Sample 14 teaches this is an iodonium salt (col 21-22) See 14/40-47 for iodonium salts. These can be used with 488 or 532 nm lasers (2/40) and for holography (1/18). Useful terminal moieties are disclosed. (col 4).

Ernst et al. DE 100571141 teaches various 2,4,6,-pyrimidinetrione compounds bounded by the formula I for sensitizing photopolymerizable compositions. Y can be S or O, X can be

methylene, oxygen, or sulfur and R2 and R3 can be hydrogen, methyl or ethyl and R1 and R5 can be alkyl. (abstract and page 3/lines 1-16). These are useful in the 370-430 nm range.

Yamaguchi et al. JP 06-175554 in example 1 teaches a rhodanine dye, PMMA, an acrylate, and an iodonium salt photoinitiator which is coated and exposed to 488 nm laser light to form a hologram with 70% diffraction efficiency.[0044-0046] In examples 2-4, the 488 nm laser was used. [0047]. 514 and 633 nm lasers were also used. (see table). The use of a HeCd laser (442 nm) is also disclosed. The use of other iodonium salts including bis(p-tert-butylphenyl) iodonium salts is disclosed [0034].

It would have been obvious to modify example 1 of Yamaguchi et al. JP 06-175554, by using another disclosed iodonium salt such as bis(p-tert-butylphenyl) iodonium hexafluorophosphate based upon the disclosed equivalence at [0034] of Yamaguchi et al. JP 06-175554 and by using other sensitizing dyes known to be useful in the holographic arts such as those of Okubo et al. '324 and Ernst et al. DE 100571141 with a reasonable expectation of successfully forming a photopolymerizable composition and recording a hologram therein with a blue laser and cites Yamaguchi et al. JP 06-175554 to establish that the use of similar rhodanine dyes to sensitize iodonium salts in holographic recording systems to 488 nm lasers is known and provide support for a reasonable expectation of success. Additionally, it would have been benzothiazolyl moieties based upon the leftmost structure at 4/25, dye D-17 and where Y is sulfur 4/38) and to modify the recording process using contact copying process to form a copy of the hologram as taught by Stevenson '409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526 and the teachings of Yamaguchi et al. JP 06-175554 to the formation of reflection holograms.

While the use of the composition with lasers offset from the absorption/sensitization maximum may not be optimal, there is a reasonable expectation of the dye being useful with various laser wavelengths covering a significant portion of the spectrum (note the use of DEAW with 488 and 532 nm, which are separated by 44 nm.). The examiner also notes that the laser wavelengths disclosed instant specification and recited in the claims are not from tunable lasers and so these lasers are somewhat inflexible in their emissions as they can only be tuned to specific emission lines corresponding to lasing transitions. The utility of the dyes over a wide range is disclosed. **The comparative examples of the application use different dyes form those of the inventive examples and so do not represent a comparison with the closest prior art. The applicant could show evidence that the exposure wavelength with the dyes recited is critical.**

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebrannt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kelly Cynthia can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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